

Operating and Assembly Instructions

Incremental hollow shaft encoder FG8

**Read the operating and assembly instructions prior to assembly, starting installation and handling!
Keep for future reference!**

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1 General

1.1 Information about the Operating and Assembly Instructions

These Operating and Assembly Instructions provide important instructions for working with the device. They must be carefully read prior to starting all tasks, and the instructions contained herein must be followed.

In addition, applicable local regulations for the prevention of industrial accidents and general safety regulations must be complied with.

1.2 Scope of delivery

Incremental hollow shaft encoder FGH 8, Operating and Assembly Instructions.

1.3 Explanation of symbols

Warnings are indicated by symbols in these operating and assembly instructions. The warnings are introduced by signal words that express the scope of the hazard.

The warnings must be strictly heeded; you must act prudently to prevent accidents, personal injury, and property damage.



WARNING!

Indicates a possibly dangerous situation that can result in death or serious injury if it is not avoided.



CAUTION!

Indicates a possibly dangerous situation that can result in minor injury if it is not avoided.



CAUTION!

Indicates a possibly dangerous situation that can result in material damage if it is not avoided.



NOTES!

Indicates useful tips and recommendations as well as information for efficient and trouble-free operation.



NOTES!

Do not use a hammer or similar tool when installing the device due to the risk of damage occurring to the bearings or coupling!



DANGER!

Life-threatening danger due to electric shock!

Indicates a life-threatening situation due to electric shock. If the safety instructions are not complied with there is danger of serious injury or death. The work that must be executed should only be performed by a qualified electrician.

1.4 Disclaimer

All information and instructions in these Operating and Assembly Instructions have been provided under due consideration of applicable guidelines, as well as our many years of experience.

The manufacturer assumes no liability for damages due to:

- Failure to follow the instructions in the operating and assembly instructions
- Non-intended use
- Deployment of untrained personnel
- Opening of the device or conversions of the device

In all other aspects the obligations agreed in the delivery contract as well as the delivery conditions of the manufacturer apply.

1.5 Copyright



NOTES!

Content information, text, drawings, graphics, and other representations are protected by copyright and are subject to commercial property rights.

It is strictly forbidden to make copies of any kind or by any means for any purpose other than in conjunction with using the device without the prior written agreement of the manufacturer. Any copyright infringements will be prosecuted.

1.6 Guarantee terms

The guarantee terms are provided in the manufacturer's terms and conditions.

1.7 Customer service

For technical information personnel is available that can be contacted by telephone, fax or email. See manufacturer's address on page 2.

2 Safety



DANGER!

This section provides an overview of all the important safety aspects that ensure protection of personnel, as well as safe and trouble-free device operation. If these safety instructions are not complied with significant hazard can occur.

2.1 Responsibility of the owner

The device is used in commercial applications. Consequently the owner of the device is subject to the legal occupational safety obligations and subject to the safety, accident prevention and environmental protection regulations that are applicable for the device's area of implementation.

2.2 Intended use

The device has been designed and constructed exclusively for the intended use described here.

Series FGH 8 Incremental hollow shaft encoder are used for measurement of rotations, for instance of electrical and mechanical drives and shafts.

Claims of any type due to damage arising from non-intended use are excluded; the owner bears sole responsibility for non-intended use.

2.3 Improper use

- Do not use the device in potentially explosive areas.
- The device must not be subjected to mechanical loads in addition to its own weight and unavoidable vibration and shock loads that arise during normal operations.

Examples for non-permitted mechanical loads (incomplete list):

- Fastening transport or lifting tackle to the device, for example a crane hook to lift a motor.
- Fastening packaging components to the device, for example ratchet straps, tarpaulins etc.
- Using the device as a step, for example by people to climb onto a motor.

2.4 Personal protective equipment

For tasks such as assembly, disassembly or commissioning the use of personal protective equipment such as safety footwear and protective work clothing is required.

The regulations specified by the owner and that are locally specified apply.

2.5 Personnel

Installation and commissioning as well as disassembly routines must be carried out by skilled technical staff only.

2.6 Special dangers

Residual risks that have been determined based on a risk assessment are cited below.

2.6.1 Electrical current



DANGER!

Life-threatening danger due to electrical shock!

There is an imminent life-threatening hazard if live parts are touched. Damage to insulation or to specific components can pose a life-threatening hazard.

Therefore:

Immediately switch off the device and have it repaired if there is damage to the insulation of the power supply.

De-energize the electrical equipment and ensure that all components are connected for all tasks on the electrical equipment.

Keep moisture away from live parts. Moisture can cause short circuits.

2.6.2 Rotating shafts / Hot surfaces



WARNING!

Danger of injury due to rotating shafts and hot surfaces!

Touching rotating shafts can cause serious injuries.

Therefore:

Do not reach into moving parts/shafts or handle moving parts/shafts during operation. Close to protect from injury all access openings in flanges with the corresponding plug screw, and provided you exposed rotating components with protective covers.

Do not open covers during operation. Prior to opening the covers ensure that all parts have come to a standstill.

The encoder can become hot during prolonged use.

In case of contact, risk of burns is existing.

2.6.3 Safeguarding against restart



DANGER!

Life-threatening danger if restarted without authorization!

When correcting faults there is danger of the power supply being switched on without authorization.

This poses a life-threatening hazard for persons in the danger zone.

Therefore:

Prior to starting work, switch off the system and safeguard it from being switched on again.

3 Technical Data

3.1 Type plate

The figure below shows an example of a nameplate:



Encoder with 2 terminal boxes

The type plate is located on the outside of the housing and contains the following information:

- Manufacturer, Address
- Type, Year of construction
- CE marking
- Serial number (S/N)
- Commission number (C/N)
- Pulse rate
- Protection class
- Power supply

3.2 Electrical and mechanical data

Pulse rates	Value
Preferred Pulse Rates	1024, 2800, 4096
Special pulse rates	600, 720, 750, 1000, 1200, 2048, 2560

Connection data	
Supply voltage	12 V to 30 V DC (option 5 V DC) Ripple max. 10 %
No load-current	approx. 100 mA at 30 V (without Option)
Outputs ¹⁾	Push-pull final stages, resistant to short-circuit
Pulse height (HTL)	approx. as supply voltage, special output:
Output current	50 mA per output
Internal resistance	50 Ω per output
Slew rate	50 V / μs

¹⁾ **Special output voltage 5V**

(specify on order)

Supply voltage: 12 V to 20 V DC or 20 V to 30 V DC

Output: push-pull output stages with inverted signals.

Pulse height: 5 V to RS 422.

Pulse duty factor	1 : 1 ± 5 %
Square wave displacement 0°, 90°	to 50 kHz < 3 % to 150 kHz < 5 %
Max. frequency	0 to 100 kHz (150 kHz on request)
Encoder temperature ranges	
Standard	0°C to + 70°C
Special temperature ranges	-25°C to + 85°C
Special output voltage 5V (TTL)	
Pulse height	5V, RS422-compatible (TIA/EIA-Standard)
Supply voltage	12 to 30 V DC
Ambient temperature	
The max. permissible ambient temperature depends on the speed and degree of protection of the device.	

Protection class acc. to DIN EN 60529	Sealing	Mechanical speed	Description	Breakaway torque
IP 54	Special seal	≤ 3000 rpm	Protection against dust and water spray	approx. 20 to 60 Ncm
IP 56** both sides	Radial shaft seal	≤ 1200 rpm	Protection against dust and water spray	approx. 60 Ncm
IP 66	Radial shaft seal		Protection against dust and water spray	approx. 70 – 100 Ncm

**Higher speed on request. Seals and attachments increase the breakaway torque.

Only DE side with gasket of radial shaft / NDE side with cover / Sealing or overall protection class IP 56 feasible.

DE = drive end side, NDE = Non drive end side

Weight	Type EK	approx. 13 kg
	Type EEK	

Signal outputs																		
<p>Basic version (n = pulses/revolution) One pulse channel (basic) with n direct square wave pulses, corresponding to the segment division and LED monitoring output. (optional).</p>																		
<p>Option 90 2nd pulse channel as basic version, but with 90° electrical phase shift.</p>																		
<p>Option N / N2 Marker pulse, mechanically fixed. One square wave pulse per revolution.</p>																		
<p>Option G Additional inverted output signals for basic and 90° channels, marker pulse LED check.</p>																		
<p>Option F With 2 or 4 times as many pulses as the basic version. No direction of motion can be derived from the multiple number of pulses. Required: Option 90°</p>																		
<p>Option B Fast and precise sensing of rotational direction at each edge of the basic and 90° channels, Required: option 90°.</p>	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th rowspan="2"></th> <th colspan="2">Output</th> <th rowspan="2"></th> </tr> <tr> <th>L</th> <th>R</th> </tr> </thead> <tbody> <tr> <td>cw</td> <td>0</td> <td>1</td> <td rowspan="2">Option B, B2</td> </tr> <tr> <td>ccw</td> <td>1</td> <td>0</td> </tr> <tr> <td>Still stand</td> <td>0</td> <td>0</td> <td>Option B2</td> </tr> </tbody> </table>		Output			L	R	cw	0	1	Option B, B2	ccw	1	0	Still stand	0	0	Option B2
	Output																	
	L	R																
cw	0	1	Option B, B2															
ccw	1	0																
Still stand	0	0	Option B2															
<p>Option B2 As option B, but with standstill sensing.</p>																		
<p>Option V Electronic pulse doubling of basic and 90° channels by multiple evaluation.</p>																		
<p>Option L Power output up to 150 mA for basic channel, 90° channel and the corresponding inverted signals.</p>																		
<p>Option J Reduced rotational frequency modulation by means of optically adjusted pulse disk.</p>																		
<p>Option S Electronic overspeed switch with 2 programmable switching outputs, EGS4 version.</p>																		

3.3 Type code

	FGH	I	8	EK	1000	G	90G	NG	2F	S	J	40P
Incremental hollow shaft encoder												
Encoder with insulating sleeve												
Series												
Connection method												
2x connection = redundant encoder z.B. EEK: 2x terminal box EK/EEK: terminal box ES/EES: EMC industrial plug ER/EER: 12-pole. round plug EC/EEC: 2 m connection cable												
Pulses per revolution												
Basic signal output												
Basic channel 0° (A) Pulse channel 90° (B) Each with inverted signals NG: Option reference pulse with inverted signal												
2F: Option 2F 4F: Option 4F B: Option B B2: Option B2												
S: Option S (EGS 4 technic in the second scanning head) L2: Option L2												
V: Option V J: Option J (J can be combined with V)												
Hollow shaft bore												
Only with hollow shafts Ø 42 ... Ø 80												
Drive shaft connection												
P: feather key way K: clamping S: spieth pressure sleeve C: taper												

4 Transport, packaging and storage

4.1 Safety instructions for transport



CAUTION!

Material damage caused by improper transport!

Observe the symbols and information on the packaging:

- Do not throw - risk of breakage
- Keep dry
- Do not expose to heat above 40 °C or direct sunlight.

4.2 Incoming goods inspection

Check delivery immediately upon receipt for completeness and possible transport damage.

Inform the forwarder directly on receipt of the goods about existing transport damages (prepare pictures for evidence).

4.3 Packaging / disposal

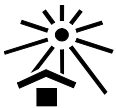
The packaging is not taken back and must be disposed of in accordance with the respective statutory regulations and local guidelines.

4.4 Storage of packages (devices)



Keep dry

Keep packages dry and free from dust; protect from moisture.



Protect against heat

Protect packages from heat above 40 °C and direct sunlight.

If you intend to store the device for a longer period of time (> 6 months) we recommend you use protective packaging (with desiccant).



NOTES!

Turn the shaft of the device every 6 month 10 times to prevent a possible hardening of the grease-filling of the ball bearings, which may lead to the destruction of the device.

5 Installation and commissioning

5.1 Safety instructions

Personnel

Installation and commissioning must be carried out by skilled technical staff only.



NOTES!

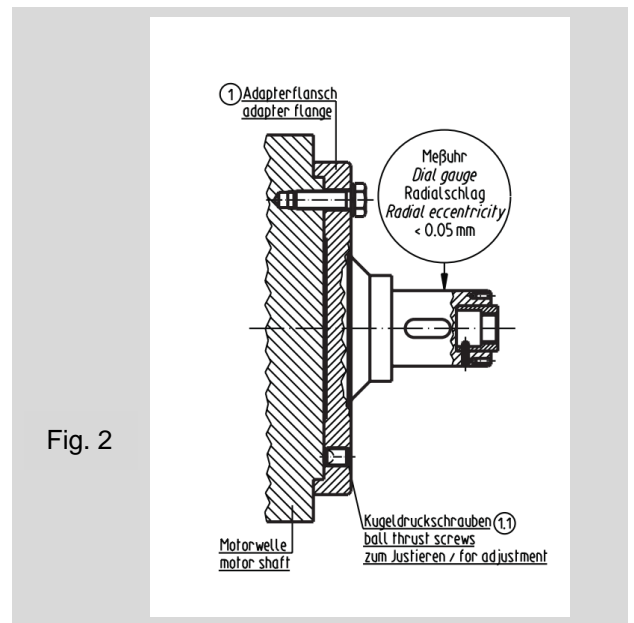
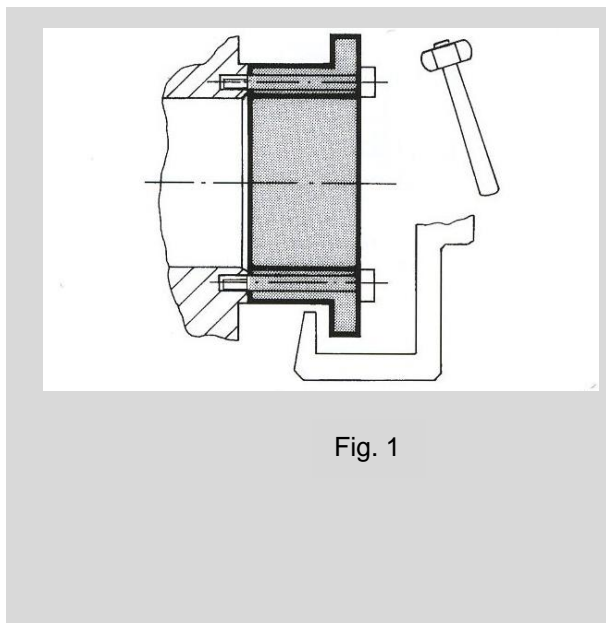
Observe the safety instructions contained in **Chapter 2** when installing or working on the device!

5.2 Mounting of the encoder (mechanical)

Mounting and disassembly by means of a hammer or similar tools is not permitted (warranty void).

5.2.1 Mounting Instruction for hollow shaft encoder

1. Adapter flange has to be mounted and to be aligned by dial gauge, if necessary optimize by ball thrust adjusting screws.
2. Ball thrust screws to be fastened with Loctite, remove non-fastened screws or fasten with Loctite! Max. torque for M12 approx. MD 25 Nm / M16 approx. MD 35 Nm.



The hollow shaft encoder has tapped holes on both sides at the front. For removal use screws to attach the mounting sleeve, and then use a puller to draw off the unit. A suitable mounting sleeve is recommended for each plant area (specify on ordering). Remove hollow shaft encoders using mounting sleeve only:

Mounting / removal sleeves for standard bores	
FGH 8..	Drg. no. E-52 443a
FGH 8 / B 14	Drg. no. E-52 760 Only mounting sleeve



NOTES!

The radial deviation of the shaft (\Rightarrow Fig. 2) should not exceed 0,05 mm.

3. Use feather keys in accordance with DIN 6885.
4. Mount the torque bracket / torque arm on the housing.



NOTES!

Comply with the information provided in the supplemental data sheet entitled "Mounting Accuracy of hollow shaft encoders".

5. Check the mounting position relative to the terminal box, adjust if necessary.
6. Push the device onto the shaft that has been lightly greased.



CAUTION!

Danger of damage to shaft and device if improperly handled.

Ensure that there are no hard impacts on hollow shaft and housing.
Use the mounting sleeve.

7. Fasten axial tensioning elements. (Screw, axial clamping shoes or flange).
8. Tighten the fastening screws on the link head of the torque bracket. Fix the nuts in place with locknuts.
9. Check the attached torque brackets:
The link rod must be easy to turn within the link head, and the link heads should not tilt. If this instruction is not followed there is a danger of bearing damage.
10. Connect the cabling in the terminal box (\Rightarrow Appendix, connecting diagrams).

5.3 Connecting the encoder

5.3.1 Connections

Cable glands are closed with a stopper to protect the devices on transport and storage.

Cable connections:

Have to be executed according to the encoder type.

Connection diagrams have to be considered!

Use of connection cables with diameter of min. 17.5 mm – max. 20 mm is essential to ensure the protection class. Cable outlet should show preferably downwards.

Option:

R: 12 - pole round plug.

S: Industrial plug

C: Connection cable

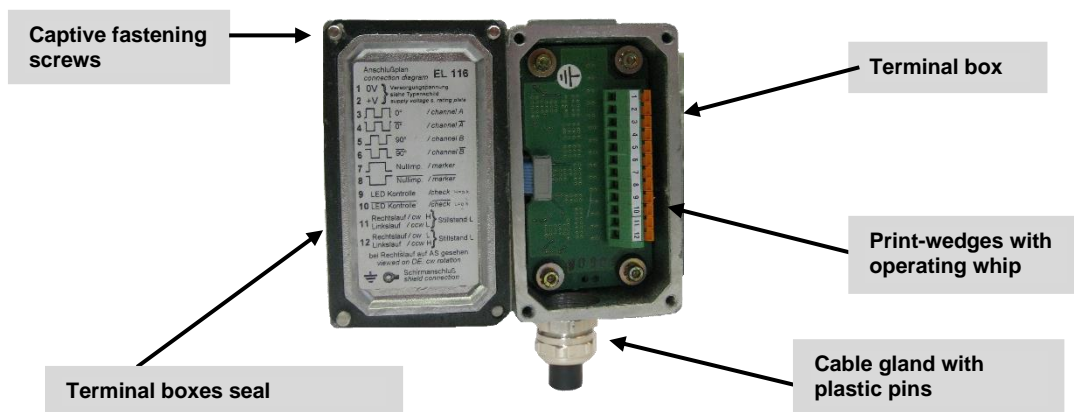
Wiring arrangement and shielding

(EMI measurement)

The cable shielding must be placed on both sides.

The shield of the signal cable has to be connected directly to the housing of the encoder by the cable gland.

You must observe applicable EMC guidelines when routing cables.



! Special note!
The connection must be carried out by skilled technical staff only.

Closing the terminal box cover:

Check the seal of the terminal box cover, clean it if soiled. Then duly close the cover.

! Note!
Cable must not be pinched.
Attention with open terminal boxes:
Moisture should not get into the terminal box when connecting the cable.

5.3.2 Technical note

Ambient temperature

The permissible ambient temperature depends on the speed and degree of protection (shaft seal) of the device and the frequency, the signal cable length and mounting situation.

See chapter 3.2

Degree of protection

To fulfill degree of protection requirements the diameter of the connection cable must correspond to that of the cable gland. Please refer to Chapter 5.3.1.

6 Dismantling

6.1 Safety instructions



Personnel:

Dismantling must be carried out by skilled technical staff only.

Observe the safety instructions contained in **Chapter 2** when dismantling the device!

6.2 Dismantling the encoder

To dismantling the encoder follow the instructions give in chapter 5.2 in the reverse order.

7 Faults

7.1 Faults table

Faults	Possible cause	Remedy
Moisture in the terminal box	Soiled terminal box gasket or seal surfaces	Clean terminal box gasket and seal surfaces
	Damaged terminal box gasket	Replace terminal box gasket
	Cable gland/blanking plug not tightened	Tighten cable gland/blanking plug
	Unsuitable cable for cable gland	Use suitable cable and cable glands
No output signals	Supply voltage not connected	Connect supply voltage
	Connection cable reversed	Wire correctly
Output signals subject to interference	Unsuitable cable	Use data cable with conductors arranged as twisted pairs and common shield
	Cable shield not connected	Connect cable shield at both ends
	Cable routing not EMC compliant	Observe applicable EMC guidelines when routing cables
Signal interruptions	Signal end stage overloaded	Check pin assignment; observe connection diagram
		Do not assign unused outputs
	Outputs short-circuited	Do not connect outputs with supply voltage or GND

Contact Hubner-Service (page 2) if none of the remedies listed above provides a solution!

8 Inspections

8.1 Safety instructions



Personnel

Skilled technical staff only are permitted to inspect the device and its installation. Observe the safety instructions contained in **Chapter 2** when inspecting or working on the device.

8.2 Maintenance information

The device is maintenance-free. However, to guarantee optimum fault-free operations we recommend that you carry out the following inspections.

8.3 Inspection schedule

Interval	Inspections	Tasks
All 12 month	Check coupling	Qualified person
All 12 month	Check the fastening screws for firm seat	Qualified person
	Check the cable connections	Qualified person
After approx. 16000 to 20000 operating hours and high long-term loading	Check deep-groove ball bearing for ease of movement and noise.	Qualified person
	Worn ball bearings have to be replaced only by the Manufacturer	Hubner – Giessen Service

9 Disposal

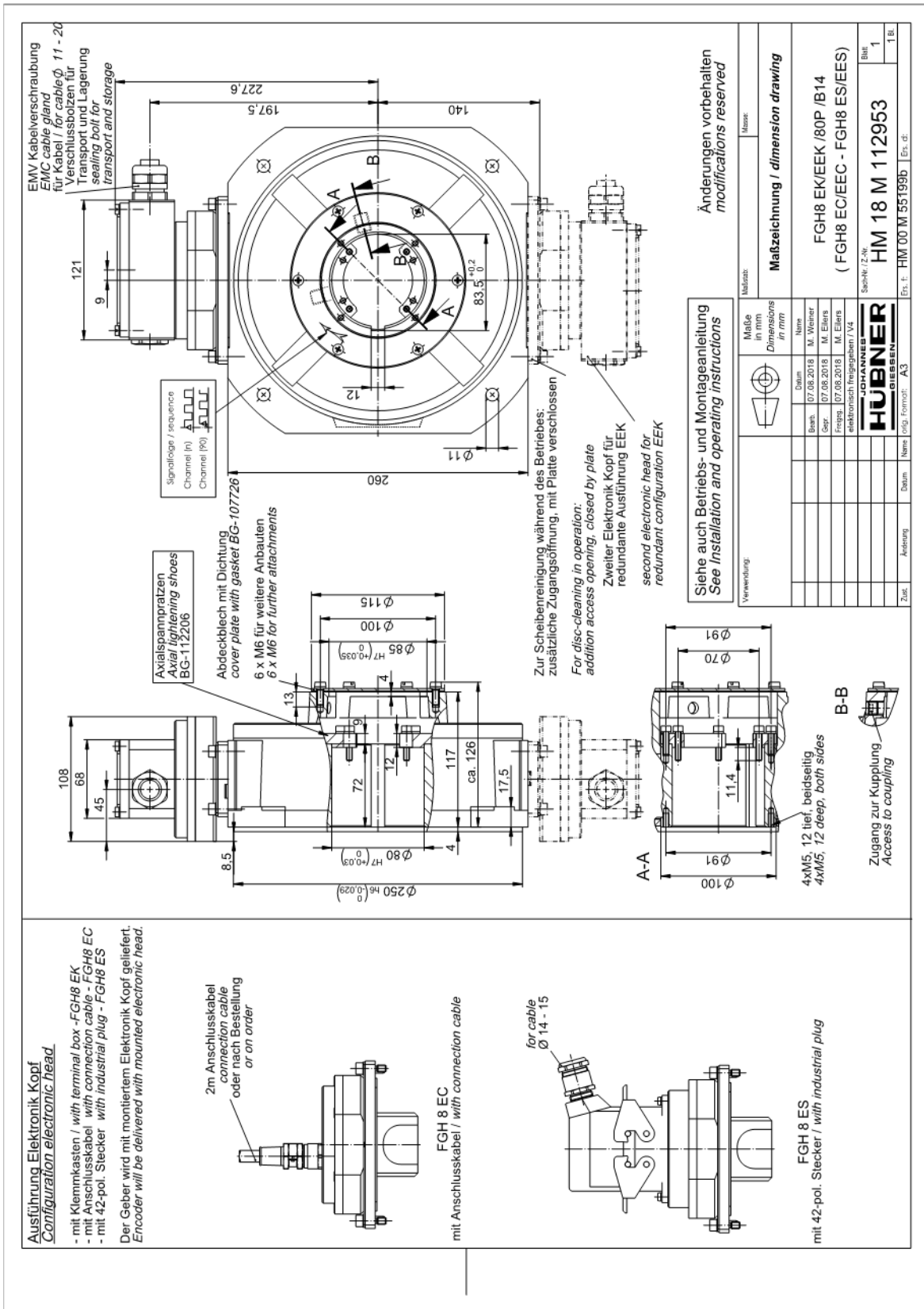
9.1 Disposal procedure

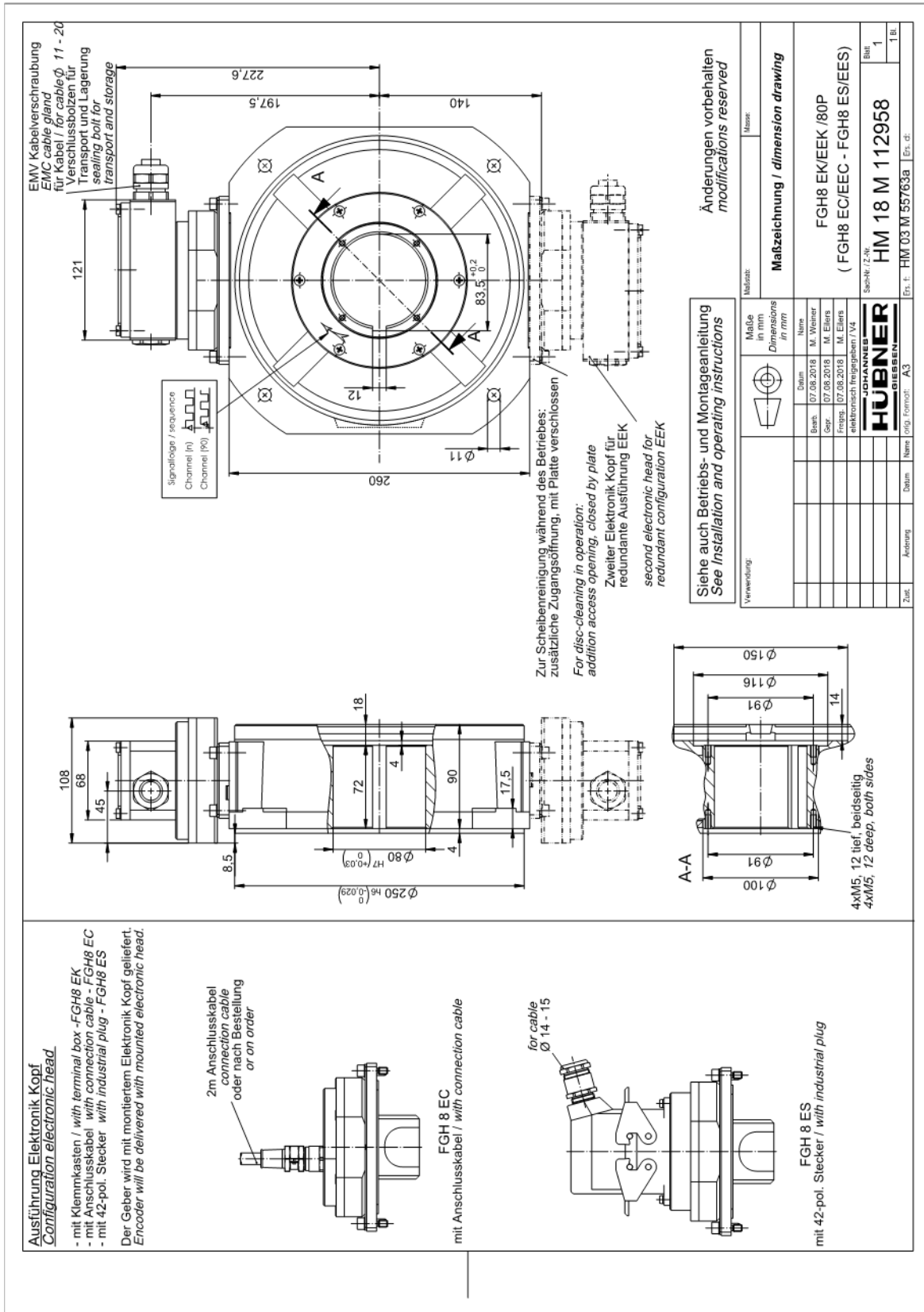
The manufacturer is not obliged to take back the device.

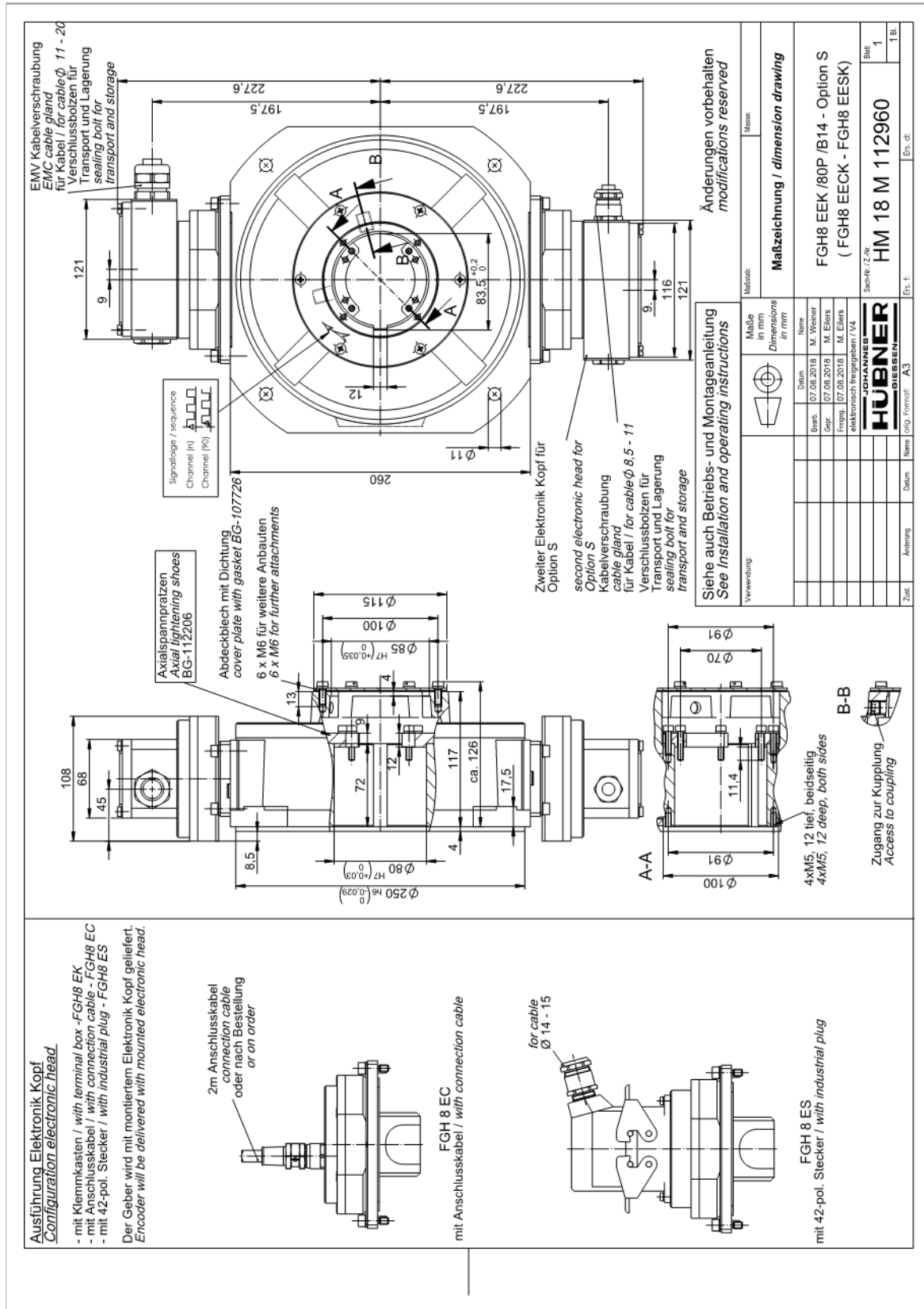
The device is classed as electronic equipment and subject to the WEEE Directive; observe local, country-specific laws when disposing of the device.

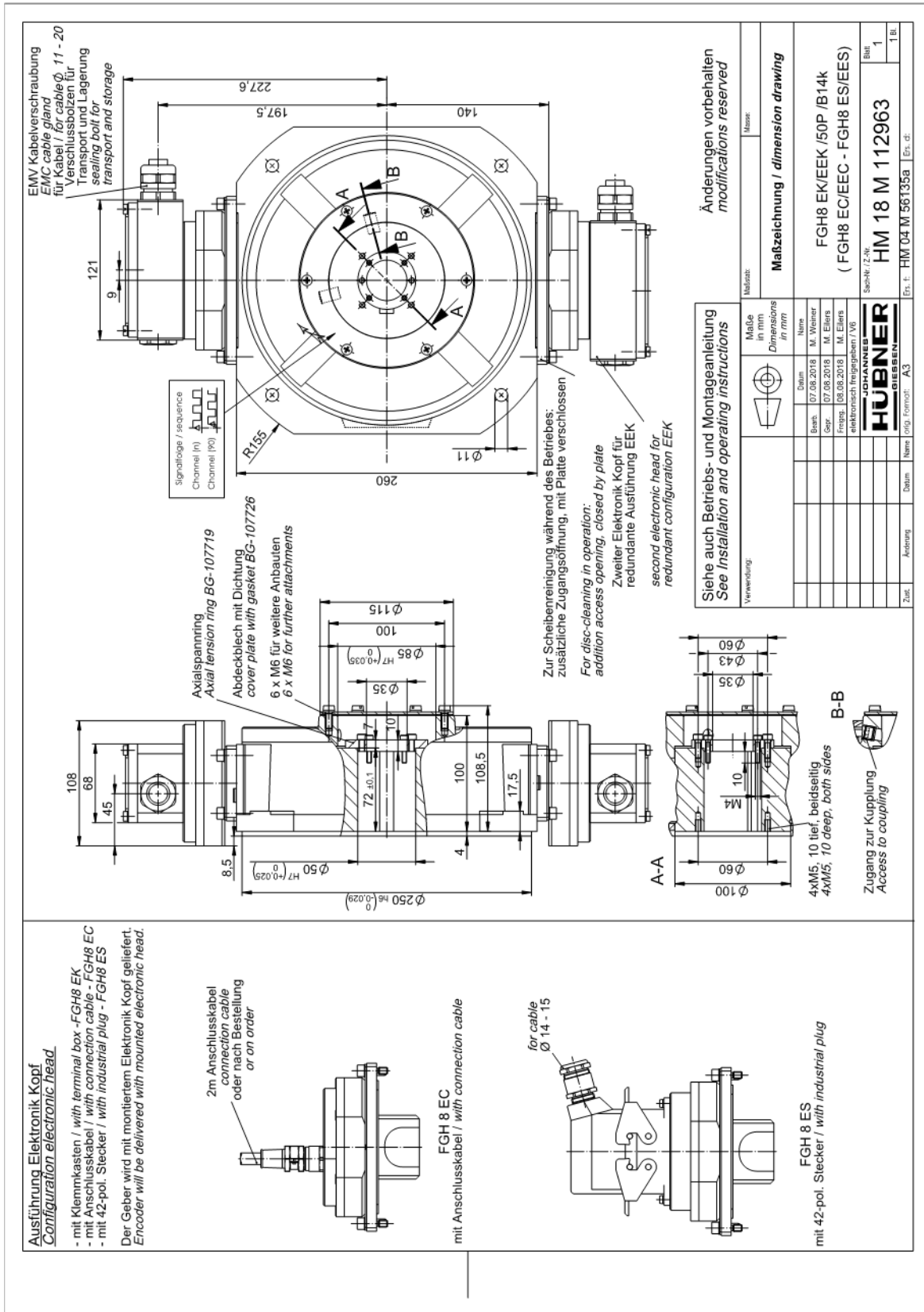
For information on environmentally sound disposal please contact your local authority or a specialist disposal company.

10 Dimension drawings









Ansicht ohne Kupplung
View without coupling

FG8 EK

FG8 EEK

Zur Scheinreinigung während des Betriebes:
zusätzliche Zugangsöffnung, mit Platte verschlossen
For disc-cleaning in operation:
additional access opening, closed by plate

FG8 EK

FG8 EEK

Zur Scheinreinigung während des Betriebes:
zusätzliche Zugangsöffnung, mit Platte verschlossen
For disc-cleaning in operation:
additional access opening, closed by plate

FG8 EK

FG8 EEK

Zur Scheinreinigung während des Betriebes:
zusätzliche Zugangsöffnung, mit Platte verschlossen
For disc-cleaning in operation:
additional access opening, closed by plate

Ausführung Elektronik Kopf
Configuration electronic head

- mit Klemmleisten / with terminal box - FG8 EK/EEK
- mit 42-pol. Stecker / with industrial plug - FG8 ES/EES

Der Caber wird mit montierten Elektronik Kopf geliefert.
Encoder will be delivered with mounted electronic head.

Chassisweite / chassis width	152 (16)	H672	Steckleitung aus / plug cable length	1000
DC-Trafo / transformer	230	HKS	Verstärker / amplifier	1000
Encoder / Encoder	AS 40	135	Kupplung / Coupling	1000

HINWEIS:
Die Encoder sind für den Einsatz in Umgebungen mit hoher Feuchtigkeit, Staub, Öl, Schweißrauch, etc. geeignet.
The encoder is suitable for use in environments with high humidity, dust, oil, welding fumes, etc.

NOTIZ:
Die Encoder sind für den Einsatz in Umgebungen mit hoher Feuchtigkeit, Staub, Öl, Schweißrauch, etc. geeignet.
The encoder is suitable for use in environments with high humidity, dust, oil, welding fumes, etc.

Maßzeichnung / dimension drawing

FG8 EK/EEK / B3

HM 18 M 112974

1. Aufl.

Drehmomentstütze mit Gelenkköpfen D12
torque bracket with link heads D12

Drehmomentstütze mit Gelenkköpfen D8
torque bracket with link heads D8

Drehmomentstütze mit Gelenkköpfen D8
torque bracket with link heads D8

EMV Kabelverschraubung
EMC cable gland
für Kabel / for cable Ø 11 - 20

Verschraubungen für
Transport und Lagerung
sealing bolts for
transport and storage

Zweiter Elektronik Kopf für
redundante Ausführung EEK
second electronic head for
redundant configuration EEK

Zur Scheibenreinigung während des Betriebes:
zusätzliche Zugangsöffnung, mit Platte verschlossen
For disc-cleaning in operation:
additional access opening, closed by plate

Ausführung Elektronik Kopf
Configuration electronic head

- mit Klemmkasten / with terminal box - FGH8 EK
- mit Anschlusskabel / with connection cable - FGH8 EC
- mit 42-pol. Stecker / with industrial plug - FGH8 ES

Der Geber wird mit montiertem Elektronik Kopf geliefert.
Encoder will be delivered with mounted electronic head.

	1165	685	695	715	730	765	800	875	915	965	1040	1100
L	500	505	520	540	560	565	600	615	640	650	670	670
	285	300	320	350	365	375	385	400	440	465	485	485
	90	100	115	125	140	150	170	200	220	250	265	265

Bei Bestellung Gelenkkopf - Ø (12/8)/L/P... angeben!
indicate link head - Ø (12/8) / L / P... on ordering!
(LH = L + 35)

Siehe auch Betriebs- und Montageanleitung
See installation and operating instructions

Änderungen vorbehalten
modifications reserved

Matzzeichnung / dimension drawing

Drehmo-kurz als Ersatz für = alte= FGH8
torque bracket short version
replacement for obsolete version

Stück-Nr. / Z-Nr.:
HM 18 M 112990

Exs. f.: HM05 M56215

Exs. c:

Verwendung:

Maße in mm Dimensions in mm	Name M. Wiener
Datum 13.08.2018	V. Eckhardt
Bearb. 13.08.2018	V. Eckhardt
Gepr. 13.08.2018	V. Eckhardt
Freigegeben 13.08.2018	V. Eckhardt
elektronisch freigegeben / v9	
JOHANNES HUBNER	
DIEBEN	
Zust.	Änderung
	Name orig. Format: A3

11 Connections

12-pol. Bandklemme Typ Phoenix
12-pole strip clamping type Phoenix

	0V	1	1	1	1	1	1	1	1
	+ ... V ¹⁾	2	2	2	2	2	2	2	2
0°		3	3; 7	3	3	3	3	3	3
0°		4	4; 8	4	4	4	4	4	4
90°		5	5; 9	5	5	5	5	5	5
90°		6	6; 10	6	6	6	6	6	6
N		7	---	---	7	7	7	---	7
N		8	---	---	8	---	8	---	8
M		9	11	9	9	8	9	9	---
M		10	12	10	10	---	10	10	---
2F		---	---	7	11	9	---	---	11
4F		---	---	8	12	10	---	7	12
4F		---	---	---	---	---	---	8	---
R		11	---	11	---	11	---	11	9
L		12	---	12	---	12	---	12	10
Schaltausgang 1		---	---	---	---	---	11	---	---
Schaltausgang 2		---	---	---	---	---	12	---	---

+ ... V¹⁾ Versorgungsspannung nach Typenschildangabe
supply voltage see rating plate

Die Belegung der Anschlüsse ist aus der Typenbezeichnung ersichtlich
Availability of options see type description

z.B. e.g.: FG..K-1000 G - 90 G - N G

0° channel A
0° inv. channel A inv.
90° channel B
90° inv. channel B inv.
Nullimpuls marker
Nullimp.inv. marker inv.

Verwendung:	FG .. (A)K	Allgemein-toleranzen DIN ISO 2768m	OFZ nach DIN ISO 1302	Maßstab:	
Datum:		Name:		Werkstoff:	
Bearb.:	03.06.14	Diriam		Benennung:	Anschlussplan Connection diagram
Gepr.:				Zeichnungs Nr.:	EL 816
Norm:				Blatt:	Bl.
Zust.:	Änderung	Datum:	Name		

FGH 8

standard

terminal box

Anschlusskabel direkt angelötet
6x2x0,56 paarig verseilt, geschirmt
Connection cable soldered-on directly
6x2x0,56 twin-stranded, shielded

rot red + (12 - 30)V } Versorgungsspannung
schwarz black 0V } supply voltage

orange orange 0° / channel A
schwarz black 0° inv. / channel A inv.
blau blue 90° / channel B
schwarz black 90° inv. / channel B inv.
gelb yellow Nullimpuls / marker
schwarz black Nullimpuls inv. / marker inv.
grün green LED Kontrolle / check H = o.k.
schwarz black LED Kontrolle inv. / check inv. L = o.k.
braun brown Rechtslauf / cw H } Stillstand L
schwarz black Linkslauf / ccw L }
Rechtslauf / cw L } Stillstand L
Linkslauf / ccw H }

Schirm ist mit Gehäuse verbunden
shield is connected to casing
alternativ/alternative
Der Schirm der Signalleitung ist über die Kabelverschraubung direkt mit dem Gehäuse verbunden.
The shield of the signal cable is directly connected with the housing of the encoder by the cable gland.

Typ : HE-2LVCC-CY AWG 20b
VDE 0881 zugelassen
acc. to VDE 0881
Querschnitt: 0,56 mm²
cross-section
Temperatur: -30°C bis +105°C
fest verlegt
temperature
fixed installation
-10°C bis +105°C
bewegt
flexing
Außendurchmesser: 10,1 mm
Outside dia

Die Belegung der Anschlüsse ist aus der Typenbezeichnung ersichtlich
Availability of options see type description

z.B. e.g.: FG..C-1000 G - 90 G - N G

0° channel A
0° inv. channel A inv.
90° channel B
90° inv. channel B inv.
Nullimpuls marker
Nullimp.inv. marker inv.

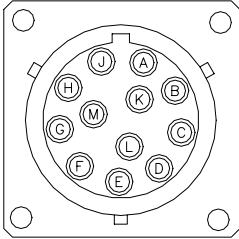
Verwendung:	FG...C	Allgemein-toleranzen DIN ISO 2768m	OFZ nach DIN ISO 1302	Maßstab:	
Datum:		Name:		Werkstoff:	
a Text (Schirm...)	22.05.92	Dz		Benennung:	Anschlussplan Connection diagram
b Kabel,Text (Schirm...)	14.02.94	Ma	Bearb.: 11.12.91	Martis	
c Kabel,Text (Schirm...)	11.11.14	DI	Gepr.:		
			Norm:		
				Zeichnungs Nr.:	EL 205
				Blatt:	Bl.
Zust.:	Änderung	Datum:	Name		

FGH 8

standard

connection cable

Ansicht auf Steckdoseneinsatz
Socket insert view



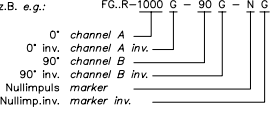
Crimpkontakte für Drahtquer-
schnitte 0,52 bis 1,5 mm²
*Crimp contacts for cross-sectional
data of wire from 0.52 up to 1.5 mm²*

Schirmung:
Der Schirm der Signalleitung ist direkt
mit dem Steckergehäuse zu verbinden.
*Shield:
The shield of the signal cable is directly
to be connected with the socket housing*

Crimpzange: Burndy Nr. MR 8 GE 5
Crimping tool: Burndy No. MR 8 GE 5

Die Belegung der Anschlüsse *Availability of options*
ist aus der Typen- *see type description*
bezeichnung ersichtlich

z.B. e.g.: FG..R-1000 G - 90 G - N G



	OV	EL 161	EL 161-1	EL 161-2
+ ... V ¹⁾	A	A	A	A
0°	B	B	B	B
0°	C	C	C	C
90°	D	D	D	D
90°	E	E	E	E
90°	F	F	F	F
N	G	G	G	G
N	H	H	H	H
M	J	J	---	---
M	K	K	---	---
2F	---	---	---	J
4F	---	---	---	K
R	L	---	---	L
L	M	---	---	M
Schaltaus- gang 1	---	---	---	---
Schaltaus- gang 2	---	---	---	---

+ ... V¹⁾ Versorgungsspannung nach Typenschildangabe
supply voltage see rating plate

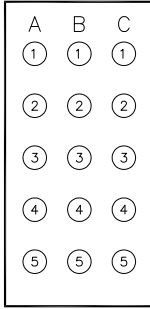
Verwendung: FG .. R	Allgemein- toleranzen DIN ISO 2768m	OFZ nach DIN ISO 1302	Maßstab:
a EL 161-2	17.05.94	Ma	Werkstoff:
	Datum:	Name	Benennung:
	Bearb. 12.06.91	Martis	Anschlußplan <i>Connection diagram</i>
	Gepr.		Zeichnungs Nr.:
	Norm		EL 161
			Blatt
			Bl.

FGH 8

standard

12 – pole round plug

Ansicht auf Steckdoseneinsatz
Socket insert view



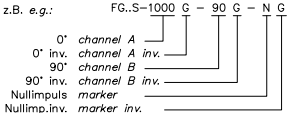
Crimpkontakte für Drahtquer-
schnitte 0,75 bis 1,0 mm²
*Crimp contacts for cross-sectional
data of wire from 0.75 up to 1.0 mm²*

Crimpzange: Harting Nr. 09 99 000 0110
Ausdrückwerkzeug: Harting Nr. 09 99 000 0012
Crimping tool: Harting No. 09 99 000 0110
Removal tool: Harting No. 09 99 000 0012

Schirmung:
Der Schirm der Signalleitung muss über
die Kabelverschraubung direkt mit dem
Gehäuse verbunden werden.
*Shield:
The shield of the signal cable has to be
connected directly to the housing of the
encoder by the cable gland.*

Die Belegung der Anschlüsse *Availability of options*
ist aus der Typen- *see type description*
bezeichnung ersichtlich

z.B. e.g.: FG..S-1000 G - 90 G - N G



	OV	EL 064	EL 064-1
+ ... V ¹⁾	C5	C5	C5
0°	A5	A5	A5
0°	A1	A1	A1
0°	A2	A2	A2
90°	A3	A3	A3
90°	A4	A4	A4
N	B3	B3	B3
N	B4	B4	B4
M	B5	B5	B5
M	C3	C3	C3
2F	C4	C4	C4
4F	B2	---	---
R	C1	C1	C1
L	C2	C2	C2
Schaltaus- gang 1	---	---	B1
Schaltaus- gang 2	---	---	B2

+ ... V¹⁾ Versorgungsspannung nach Typenschildangabe
supply voltage see rating plate

Verwendung: FG .. S	Allgemein- toleranzen DIN ISO 2768m	OFZ nach DIN ISO 1302	Maßstab:
a dt. / engl. 20.03.96	Ma	Datum:	Name
b EMV-Harting 29.04.11	Di	Bearb. 24.09.92	Martis
		Gepr.	
		Norm	
			Benennung:
			Anschlußplan <i>Connection diagram</i>
			Zeichnungs Nr.:
			EL 064
			Blatt
			Bl.

FGH 8

standard

15 – pole industrial plug

Ansicht auf Steckdoseneinsatz HAN 42DD
Socket insert view HAN 42DD

Crimpkontakte für Drahtquerschnitte 0,75 bis 1,0 mm²
Crimp contacts for cross-sectional data of wire from 0.75 up to 1.0 mm²

Crimpzange: Harting Nr. 09 99 000 0110
Ausdrückwerkzeug: Harting Nr. 09 99 000 0012
Crimping tool: Harting No. 09 99 000 0110
Removal tool: Harting No. 09 99 000 0012

	OV	EL 482
	+ ... V ¹⁾	1
0°		2
0°		3
90°		4
90°		5
90°		6
N		7
N		8
M		9
M		10
2F		11
4F		12
R		13
L		14
Schaltgang 1		15
Schaltgang 2		16

Schirmung: Der Schirm der Signalleitung ist direkt mit dem Steckergehäuse zu verbinden.
Shield: The shield of the signal cable is directly to be connected with the socket housing

+ ... V¹⁾ Versorgungsspannung nach Typenschildangabe
supply voltage see rating plate

Die Belegung der Anschlüsse ist aus der Typenbezeichnung ersichtlich
Availability of options see type description

z.B. e.g.: FG.S-1000 G - 90 G - N G

0° channel A
0° inv. channel A inv.
90° channel B
90° inv. channel B inv.
Nullimpuls marker
Nullimp.inv. marker inv.

Verwendung:	Allgemeintoleranzen DIN ISO 2768m	OFZ nach DIN ISO 1302	Maßstab:
FG .. S			Werkstoff:
	Datum:	Name	Benennung:
	Bearb. 17.03.98	Martis	Anschlußplan Connection diagram
	Gepr.:		
	Norm:		
			Zeichnungs Nr.:
			EL 482
Zust.	Änderung	Datum:	Name

FGH 8

standard

42 pole industrial plug